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## FIREFLIES OF THE GENUS PYRACTONEMA (COLEOPTERA: LAMPYRIDAE)

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### Introduction

Solier (1849) described nine new species of Lampyridae from Chile and placed them in a new genus, *Pyractonema*. Fairmaire and Germain (1862) described as *Lucidota* three new species that were subsequently removed to *Pyractonema*, and Gemminger and Harold (1869) changed the specific trivial name of Solier's *P. compressicornis* to *depressicornis*, the former being preoccupied in *Lucidota*. The first species referred to in the literature belonging in this genus is *P. obscura* (G. A. Olivier, 1790) from Tierra del Fuego. To this species E. Olivier (1907, 1910) referred four of Solier's species and also two others; *P. bardelli* (le Guillou, 1844) and *P. bioculata* (Blanchard, 1853.) He also referred Solier's *P. rhododera* to this species, but *rhododera* is herein reestablished as a valid species. Since E. Olivier (1907, p. 6) had access to the collections of his grandfather, G. A. Olivier, and of Fairmaire (although he remarks, p. 62, that the latter is in "inextricable disorder"), it must be assumed that he made the comparisons necessary to convince him of this synonymy. Thus, of the 15 described species, E. Olivier (1907, 1910) recognized only 9. No other species definitely referable to this genus appears to have been described since those of Fairmaire and Germain. E. Olivier (1902) described three Japanese species but subsequently transferred them to *Lucidina*.

It is noted that E. Olivier's (1907) generic description does not entirely agree with Solier's. Nor do the latter's descriptions of the species exactly meet his generic characters, a condition which my examination of the specimens at hand confirms.

Barber (1951, p. 16) designated *P. depressicornis* Gemminger (*compressicornis* Solier) as the type species. From the standpoint of being typical of the genus, this species, with wide pale elytral borders, is perhaps less satisfactory than say, *P. obscura*, although it is the first in Solier's descriptions.

#### POSITION OF PYRACTONEMA AMONG THE LAMPYRIDAE

E. Olivier (1907, 1910) placed *Pyractonema* in his subfamily Lucidotinae. As was noted above, Fairmaire and Germain called their species *Lucidota*, and there is, indeed, very little in the published descriptions to differentiate *Pyractonema* from many of the species commonly called *Lucidota*, the principal difference being the very depressed body of most species of *Pyractonema*. However, the large genus *Lucidota*, with over 100 species, is obviously composite and probably includes a considerable number that are properly *Ellychnia* and *Pyropyga*.

As was also mentioned, E. Olivier (1902) originally described three Japanese species as *Pyractonema* but subsequently removed them to *Lucidina* (Gorham, 1883). The chief distinguishing character of the latter genus is the deeply cleft tarsal claw resulting in a 3-clawed appearance, but in the writer's experience this condition is not constant in all claws of species of *Lucidina*. Occasional specimens of Chilean *Pyractonema* have some claws so divided. Thus, aside from the widely different geographic distribution, only the described long, apically attenuate pronotum of *Lucidina* distinguishes it from *Pyractonema*.

#### SOURCES OF MATERIAL STUDIED

I received from Luis E. Peña, of Santiago, Chile, a large series of Chilean lampyrids, the majority being of the *P. nigripennis* group, which must be very abundant, together with several larvae of at least two types. A rather striking feature of this collection is the great general similarity of the species, although they range from 5 to 24 mm. long. A few specimens of Chilean cantharids also resemble the lampyrids in their black elytra and reddish or black-striped red pronota. Apparently the adults are not appreciably luminous, if at all so, and the majority seem to be diurnal. If present, the luminous organs are rudimentary, frequently merely minute pale scales, or sometimes distinct red spots, occasionally centrally yellow, on the 8th ventral segment, where the residual larval luminous organs are situated in other lampyrids. Although Peña states that he has never

seen a luminous firefly in Chile, he mentioned that one species, *P. depressicornis*, was only taken after sunset. In this species, the male has luminous organs nearly as large as in some species of *Diphotos*, though in the two females seen, these organs were very small.

Most of the specimens were collected in December, January, and February at altitudes from 600 to 1,700 meters, and between latitudes 33° and 38° S. A few were collected at lower levels and some on the island of Chiloe at latitude 42° S. For most of the species there is no evidence of restriction to a given locality or altitude, although *P. angustata* was collected only at relatively high stations. One specimen of *P. depressicornis* was taken at Nogueche and one at Concepción. All the others were from Pellehue and Tregualemo.

Subsequent to the examination of the material received from Peña, an opportunity was provided by J. W. Green of the California Academy of Sciences to examine 482 specimens of nonluminous South American Lampyridae, mostly *Pyractonema* from Chile, in the Reed Collections. For the most part, these specimens presented nothing not covered by Peña's specimens, except for the collecting stations. Among 108 specimens of *P. haemorrhoea*, there were a few which were intermediate between the large and smaller forms in Peña's shipment; one male of this species was distinctly brown and another was partially so; in several specimens the terminal abdominal segment was yellow instead of red, and in three the color was absent. A few specimens in the *nigripennis* group had yellow instead of red pronotal coloration; all brachelytral specimens were females. One small, brown, female specimen with a yellow pronotum looked rather clearly different from any other, and was identified as *P. vicina* Solier. A description prepared from this specimen and two males in the U.S. National Museum has been included with the other descriptions.

The specimens of *P. rhododera* in the California collection ranged from 3.5 to nearly 12 mm. long, measurements that agree with Solier's range. If a sharp segregation on length were possible, it would seem that two species are included under this name, but some were intermediate, and it seems unwise to make an arbitrary division on this basis, as is done in the *nigripennis* group, for a relatively scarcer species. Specimens 3.5 to 8 mm. long were collected at the same station and about three weeks apart. Two pairs (taken in copulation) were both of the small form.

A later shipment of Chilean insects received from Peña contained several specimens of a species of *Pyractonema* different from any previously described, particularly in their small size and the shape of the pronotum, which is markedly long in proportion to the width and widest at apical third. Because of their fragility and small size, they proved difficult to handle. The description is based on 6 males and

5 females. There were three pairs in copulation, and all were from the same locality. As in most other species of the genus, they are without developed luminous organs. Also in common with other species, the elytra of the females vary considerably in relative length, and from 1 to 3 abdominal segments are exposed. While occasional small specimens of *P. obscura*, *P. albomarginata*, and *P. rhododera* approach the length of this species, here named *P. minor*, these specimens may be distinguished by the specific characters. The holotype, female allotype, and five paratypes have been sent to Peña.

#### AEDEAGI

The aedeagi were extracted after they were relaxed in a moist chamber, dried in acetone a few minutes, and immediately mounted on Nylon filaments with Duco cement. The base of the filament was cemented to a point, which was then pinned like a specimen. Measurements were made on the mounted aedeagus, and outline drawings were made with a camera lucida.

Comparisons of the aedeagi revealed that by simple inspection of the specimens, *P. bifenestrata* could not be definitely separated from *P. obscura*. Small specimens provisionally classed as the former sometimes showed the aedeagus characteristic of the latter, and vice versa. Except for the aedeagus of *bifenestrata*, there is some general resemblance in this organ among the various species. In *P. nigripennis* and *P. depressicornis*, the lateral lobes were usually more or less spread as shown in the drawings. Since some of the species were originally described as *Lucidota*, it seemed worthwhile to compare the aedeagus of *Lucidota atra*, which, like *Pyraclonema*, is diurnal and nonluminous, with those of the latter genus. The long, narrow structure of this organ in *atra*, however, is not comparable to that of any of the species of *Pyraclonema* except possibly *bifenestrata*, and it lacks the broad cultriform median lobe of the latter. Somewhat surprising is the fact that the aedeagus of *bifenestrata* should be noticeably different from those of its congeners. The aedeagus of *Lucidina puerile* E. Olivier, from Japan, is similar in form to that of *P. bifenestrata*, but the median lobe is not cultriform and the lateral lobes have expanded apical portions.

The outline drawings which I have included are intended as aids in identification; however, I do not attempt to indicate internal structure or function of parts.

#### MISCELLANEOUS NOTES ON VARIANTS AND LARVAE

A few specimens, all males and mostly from Parral, did not quite meet the descriptions of the species given herein. Examination of the aedeagi showed them to be much like that of *P. bifenestrata*, and these



specimens therefore probably represent some local variant of that species, although because of the much reduced pronotal infuscation, they are superficially more like a larger *P. latior*.

The almost startling similarity, especially in the pronotal appearance, of many of the species has been noted, and applies particularly to the *nigripennis* group, and also to *depressicornis* and *haemorrhoea*. Structurally as well as in coloration, most of the members of the genus are quite similar, which may be taken to indicate relatively recent speciation. The adaptation of *P. obscura* to the seemingly unfavorable habitat (from the lampyrid standpoint) of Tierra del Fuego, latitude 55° S., is interesting; *Lampyrus noctiluca* in England and Europe is at about a corresponding latitude north but in a more favorable climate.

In the course of the work, it was noted that the odor of the collection, especially of the *nigripennis* group, was very similar to that of collections of the North American *Photinus pyralis*, though rather more pronounced. Alcoholic extracts of the specimens of this genus did not develop a blue fluorescence as do similar extracts of *Photinus*.

While nothing definite is known about the life history of *Pyractonema* or their habits, the mouth parts are complete, and it may be that the adults feed occasionally, probably on other insects, as is the case in *Photuris* and *Photinus*. More probably, most of the feeding is done in the larval stage as is usual among lampyrids, the principal food probably being snails (Peña). One specimen bore a minute tick.

The larvae in the collection do not differ materially in superficial appearance from those of North American lampyrids. The largest were 18.35 and 19.65 mm. long by 5.1 and 4.3 mm. broad at the mesonotal and metanotal segments, and taper posteriorly. The pronotum of the smaller of the larvae was but little narrowed in front and the head was unusually large with very long, slender, tapering mandibles, the distance across the bases of the latter being over 1.5 mm. The legs and antennae were also unusually long for a lampyrid larva. It was brown with yellow lateral borders on all the segments, and the abdominal segments have subtriangular laterally projecting plates, all of which present a serrate appearance. The larger larva was practically black, granulose, and had posterolateral angles on all segments which were yellow to a rather bright salmon-pink. The head was much smaller than in the smaller larva, black, cylindrical, and bore a pair of short mandibles slightly curved upwards. Both larvae had a pair of luminous organs, apparently functional, on the lateral thirds of the 8th abdominal segment. I concluded (1956) that the latter one represents a juvenile state of the giant glow worms found in South America.

Another larva was 15 mm. long, and uniformly 3 mm. broad from the second thoracic to the 6th abdominal segment. The head was small, the antennae relatively long, and the coxal cavities long, narrow, pointed distally and white basally. The dorsal surface above the luminous organs was translucent, the light evidently being visible from above. Except for the structure of the terminal abdominal segment, this larva might have been thought to be a larviform female.

The spiracles on all of these larvae were on the ventral surface of the lateral lobes of the abdominal segments. In the absence of rearing tests, it is usually impossible to say what species a given larvae represents and no attempt can be made to do so with these glow worms.

The advice of J. W. Green, T. J. Spilman, and C. W. Sabrosky is acknowledged with appreciation.

### Genus *Pyractonema* Solier

*Pyractonema* Solier in Gay, Hist. Fis. Pol. Chile, vol. 4, Zool. pp. 445 ff., 1849.

DIAGNOSIS: *Pyractonema* is a genus of nearly or entirely nonluminous lampyrids at present known only from Chile and adjacent parts of Argentina and possibly extending up the slopes of the Andes to Bolivia and Peru. The possibility that *Lucidina* should be included is at present ruled out. Before giving the key to the species, and their descriptions, it may be well to call attention to some points of general similarity which are not always repeated in the individual descriptions, and to some of the intraspecific variations which have been noted.

The body is noticeably dorsoventrally compressed in most species, sometimes so much so as to seem to leave little space for internal organs. While this condition may be an artifact in closely packed specimens, it appears to be a natural feature in this genus.

The pronotum is usually semicircular or semielliptical, frequently slightly prolonged apically, usually distinctly wider than long and frequently markedly so in females. The base may be nearly straight between the angles, slightly emarginate, or sinuate. The posterolateral angles may be posteriorly produced, salient to the lateral edges, or merely rounded. There may be a median, narrow, longitudinal channel or a relatively wide sulcus, or even a fine carina usually confined to the basal half or two-thirds. The lateral margins are usually reflexed, and the apical margin is slightly reflexed in most specimens. The disk is usually smooth or very finely punctulate, while the remainder of the surface is coarsely punctate, with a submarginal row of large punctures. The scutellum is asymmetrically diamond-shaped, the basal point being obtuse, and the apical half being longer with a rounded apex. The scutellum is dark brown or black, and usually hairy. The mesonotal plates are usually dull black. The

elytra appear black in the closed position over the wings, but are a somewhat translucent dark brown by transmitted light; in all species they are finely and densely granulose. Costae usually number two or three but are often indistinct and frequently evanescent apically; explanate margins are generally narrow, except in the smaller variety of *P. haemorrhoea*.

The head and eyes are relatively rather small as compared with those of the luminous lampyrids. The frons is black or dark brown, and in some species appears to project bulbously between the antennal sockets. The mandibles are brown, approximately circularly curved. The maxillary palpi are black or dark brown, with a terminal article of conoidal outline flattened on the inside, and are rather large. The labial palpi are relatively small, brown, and modified securiform. The clypeus is not connate with the front, is short, black, or dark brown, and is usually semicircular, but it may be sinuate or even tridentate. The labrum may project forward of the clypeus as a white, membranous area.

The prosternum is usually almost entirely pink, as is most of the mesosternum. The metasternum is entirely black. Except in *P. haemorrhoea*, the abdominal segments are all black or dark brown, though the pygidium may be partly translucent. The "dentate" abdominal structure mentioned in the older descriptions refers to the posteriorly projecting lateral lobes on tergites 5, 6, and 7.

The legs are all black, although their vestiture may be brown. Claws are usually entire, rarely cleft, and sometimes with a short basal spur. Tibial spurs are very small, frequently indistinguishable at 30 × magnification.

The antennae are of the same general type in all of the species. Articles number 11, of which 1 is club shaped, 2 is short and conical, and 3-10 are usually wide and much compressed, this widening being much more pronounced in some species than in others. Articles 4 to 11 are attached at their bases to the outer edge of the apex of the preceding article, and thus give a somewhat serrate appearance, which is most pronounced in *P. depressicornis*. The terminal article is narrowly elliptical, and 4 to 11 are more or less hairy. In the males, the antennae are usually somewhat more than one-half the total length (pronotum plus elytra), and less than one-half in the females.

REMARKS: From my work on this genus, it appears that the following species are valid: *albomarginata*, *bifenestrata*, *depressicornis*, *haemorrhoea*, *nigripennis*, *obscura*, *rhododera*, *subulipennis* (not seen), *vicina*, and the new species, *angustata*, *laticornis*, and *minor*.

On the basis of the comments of Ferris (1928), it has seemed worthwhile to redescribe the known species recognized in the material studied. The descriptions of new species and redescrptions of old species

following the key below are arranged in alphabetical order of the specific names.

Key to the Species of *Pyractonema*

1. Elytra uniformly black or dark brown . . . . . 2  
   Elytra with pale borders . . . . . 10
2. Abdominal sternites black or dark brown, except rudimentary luminous organs . . . . . 4  
   Abdominal sternites either completely or in part red or rarely yellow or white . . . . . 3
3. Eighth abdominal sternite red, rarely yellow or white; 10 to 19 mm. long.  
     *Pyractonema haemorrhoea* (Fairmaire and Germain)  
     All abdominal sternites red; elytra attenuate; 5.0 mm. long (not seen).  
     *Pyractonema subulipennis* (Fairmaire and Germain)
4. Pronotum with two subrectangular or reniform red spots (these occasionally yellow) surrounded by wide black borders and vitta (*PYRACTONEMA NIGRIPENNIS* group) . . . . . 5  
   Pronotal pigmentation otherwise . . . . . 6
5. 14 to 19.5 mm. long, or to 24 mm. in females.  
     *Pyractonema nigripennis* Solier  
     10 to 15 mm. long. . *Pyractonema bifenestrata* (Fairmaire and Germain)  
     5 to 11 mm. long . . . . . *Pyractonema obscura* (G. A. Olivier)
6. Pronotum yellow or red with irregular black markings; parallel; body less depressed than in most species; 9 to 12 mm. long.  
     *Pyractonema vicina* Solier  
     Pronotum reddish on disc . . . . . 7
7. Pronotum with lateral and apical borders colorless and translucent, or with a very narrow light brown border which is usually incomplete; narrow, parallel outline; 6.5 to 10 mm. long.  
     *Pyractonema angustata* new species  
     Pronotum with lateral and apical borders at least in part dark brown or black . . . . . 8
8. Pronotum orange-red or yellow in basal two-thirds; translucent apically; no median vitta; widest in apical third; insects very small and narrow; 3.5 to 5.0 mm. long . . . . . *Pyractonema minor* new species  
     Pronotum coral-red, or pink to red . . . . . 9
9. Pronotum mainly red; narrow borders and usually incomplete median vitta, black; outline long-elliptical; 7.5 to 12 mm. long.  
     *Pyractomena latior* new species  
     Pronotum opaque coral-red, with narrow black border and rarely a very narrow black median vitta; outline parallel; 4 to 12 mm. long.  
     *Pyractonema rhododera* Solier
10. Large insects, 11.5 to 18 mm. long; elytra with lateral and apical borders yellow . . . . . *Pyractonema depressicornis* Gemminger and Harold  
   Smaller insects 7 to 11 mm. long; elytra with lateral and apical borders white . . . . . *Pyractonema albomarginata* Solier



*Pyractonema albomarginata* Solier

## FIGURE 1

*Pyractonema albomarginata* Solier, in Gay, Hist. Fis. Pol. Chile, vol. 4, Zool. p. 447, 1849.

Material: 51 specimens, of which 45, including 10 females, were of the typical variety, and 6 including 4 females were smaller. The latter are not given a varietal name, however, as it seems probable that intermediates will be found.

General: A small, nonluminous lampyrid easily distinguished by the white-margined elytra.

Dimensions: Typical males 7.65 to 11.65 mm. long by 2.35 to 2.42 mm. broad, average 9.4 by 2.9 mm. Females 6.75 to 9.6 mm. long by 2.45 to 3.45 mm. broad; average 7.9 by 2.9 mm. Smaller males 6.66 to 6.98 mm. long by 1.89 to 2.29 mm. broad; average 6.8 by 2.1 mm. Smaller females 4.72 to 6.45 mm. long by 2.02 to 2.55 mm. broad; average 5.69 by 2.28 mm.

Pronotum of males 1.2 to 1.7 mm. long by 1.92 to 2.6 mm. broad. General outline semicircular or semielliptical, sometimes a little extended apically especially in males, with a transverse subrectangular red spot occupying about half of the total area and not quite reaching the base. Marginal borders translucent, reflexed at sides and apex, rather coarsely and closely punctate. Basal border narrow. In occasional specimens the lateral and apical edges brown, the infuscation of the latter sometimes long-triangular, apex forward. One specimen had two black spots at lateral thirds adjacent to the posterior edge. Disc smooth, occasionally inflated, median channel sometimes infusate. Posterolateral angles very variable, from dull rounded to acutely produced. Basal margin usually slightly sinuate, sometimes circularly curved. Maximum width usually from just forward of the angles to basal fifth. Females similar but relatively slightly wider and angles less prominent.

Scutellum black. One specimen had a small median red spot, and another a long red mark in the apical half. Mesonotal plates black.

Elytra black, with narrow, translucent white lateral borders, widened apically. No sutural borders. Subparallel to apical third or fourth, then tapering in lateral margin. Occasionally slightly widest at about midlength. Very narrow explanate margins.

Head black. Antennal sockets white or pink. Eyes small, width across them about 0.75 to 0.8 of pronotal width. Clypeus short, dark brown, usually feebly emarginate.

Antennae black. Articles 3 to 11 very compressed and of about equal length.

Tergites all black. Pygidium in male as wide as 7th segment, deeply emarginate, in female triangular.

Ventral segments 2 to 6 very dark brown to black, 7 and 8 black. Segment 8 medially bulbous in male to accomodate the aedeagus. No indication of luminous organs. In female, segment 8 ogival, with deep V-shaped median apical notch, not bulbous, and usually exposed beyond the elytra.

Legs black, hairy, compressed. Tibial spurs discernible with difficulty, pattern apparently 0-1-1. Claws without basal spurs.

Aedeagus as in figure 1.

A small species, readily recognizable by the white-margined elytra. Of this species there were 51 specimens, including 10 females, of which many were longer than the 7.7 mm. maximum given by Solier. There were also 6 smaller specimens, 4 of which were females.

*Pyractonema angustata*, new species

FIGURE 2

Material: 7 males and 3 females, including one pair in copulation. Distinguishable from other species by narrow, parallel form and the absence of infuscation on the pronotum. Two of the females were brachelytral, leaving 3 abdominal segments exposed.

Type locality: Enco, Chile.

Holotype and 6 paratypes, USNM 62820.

General: A small narrow, nonluminous lampyrid with no pronotal infuscation and a transverse pink or red subrectangular disc.

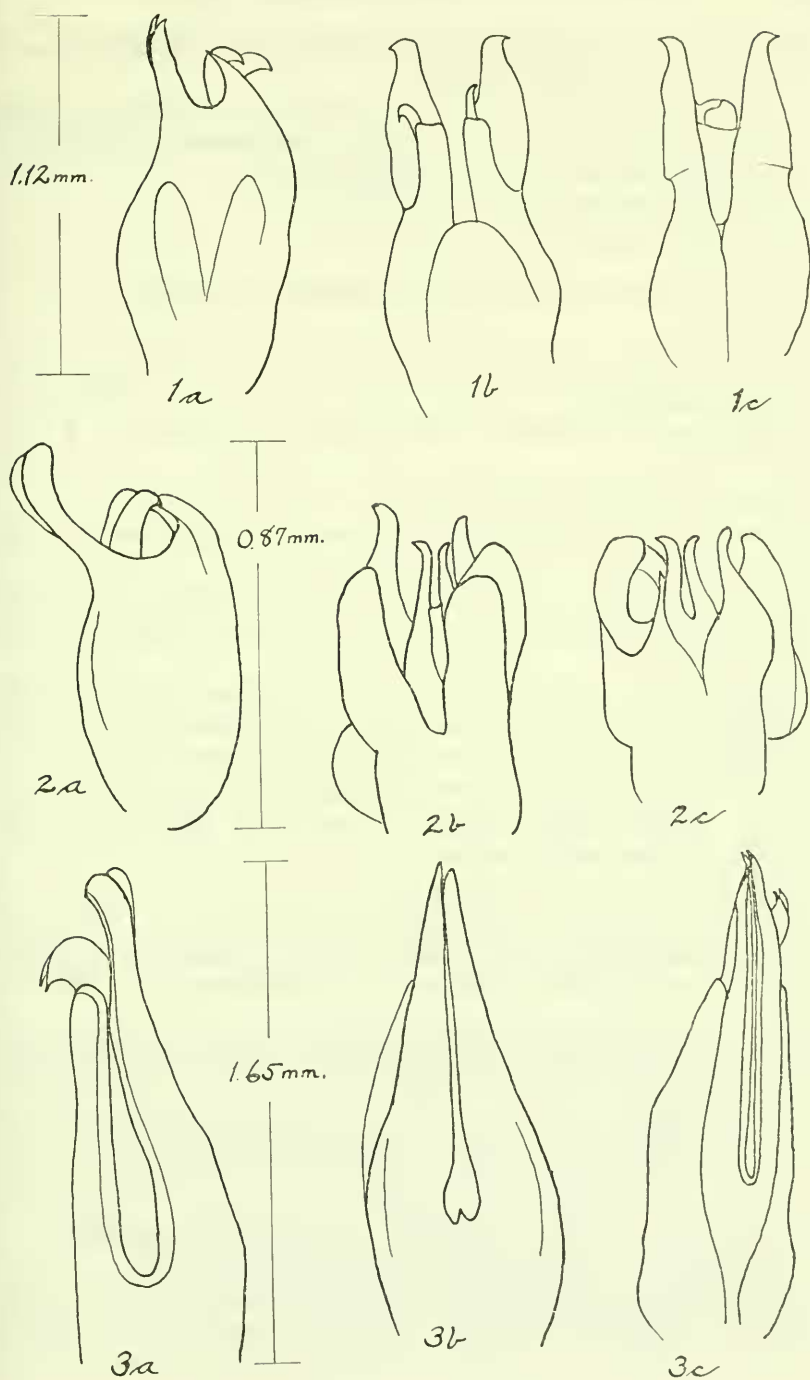
Dimensions: Males 6.69 to 9.59 mm. long by 2.04 to 2.70 mm. broad; average 7.83 by 2.31 mm. Females 6.87 to 9.03 mm. long by 2.04 to 2.8 mm. broad; average 7.91 by 2.29 mm.

Pronotum of males 1.28 to 1.66 mm. long by 1.58 to 2.24 mm. broad. Females 1.33 to 1.63 mm. long by 1.66 to 2.37 mm. broad. Usually widest in basal third or fourth. Apex slightly reflexed. Transverse subrectangular rose-red area in basal two-thirds and median three-fourths. No median vitta but frequently a narrow channel in basal half. No infusate marginal borders (one female had a very narrow brown marginal line). Apical and lateral surfaces transparent, coarsely punctulate.

Scutellum black or dark brown. Mesonotal plates dull black or dark brown.

Elytra black (one male had narrow, pale, apical borders). Usually bicostate. About 0.8 of total length in male, frequently short in female, exposing 3 abdominal segments.

Antennae black, compressed. Structure much as in the *P. nigripennis* group.



FIGURES 1-3.—Aedeagus: 1, *Pyractonema albomarginata*; 2, *Pyractonema angustata*; 3, *Pyractonema bifenestrata*. (a, lateral view; b, dorsal view; and c, ventral view.)

Tergites black. Pygidium in male narrowed to an emarginate apex in apical third; in female, triangular.

Ventral segments: All black or very dark brown. Usually no trace of luminous organs, but one male had the last ventral medially pink with pink rudimentary luminous organs laterally.

Legs dark brown to black. Claws simple.

Aedeagus as in figure 2.

*Pyraclonema depressicornis* Gemminger and Harold

FIGURE 4

*Pyraclonema depressicornis* Gemminger and Harold, Cat. Col. Des. Syn. Syst., vol. 6, p. 1639, 1870.

*Pyraclonema compressicornis* Solier, in Gay, Hist. Fisc. Pol. Chile, vol. 4, Zool., p. 446, 1849.

Material: 35 males and 2 females.

General: A large, probably nonluminous lampyrid, with elytra bordered yellow.

Dimensions: Males 11.5 to 18 mm. long by 3.5 to 7.0 mm. broad; average 15.0 by 5.0 mm. Females 12.5 to 14.5 mm. long by 3.5 to 4.25 mm. broad.

Pronotum with lateral margins slightly reflexed, apical margin somewhat more so. Black except for two subrectangular red spots occupying about 0.3 of total area. Disc not deeply channeled if at all so, sometimes with a low carina in basal half. About 0.8 as long as wide. Outline nearly semicircular, except for slight apical prolongation, less marked in females.

Scutellum and mesonotal plates black.

Elytra long, parallel or subparallel, usually tricostate. Black with pronounced yellow lateral and apical borders about 0.2 of elytral width. No sutural border. Very narrow explanate margins. Sparsely hairy.

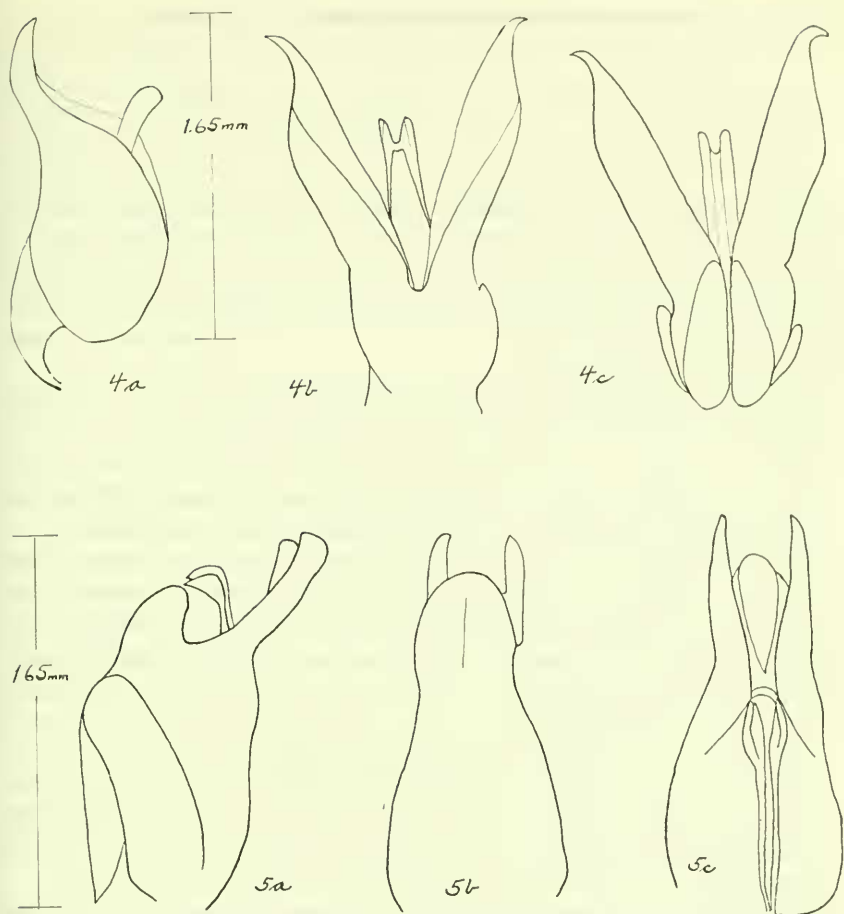
Head with frons black, slightly prominent in front. Eyes small, width across them about 0.6 of pronotal width. Clypeus short, black, tridentate.

Antennae long, up to 0.75 of body length, shorter in females. Articles 3 and 4 shorter than 5 to 11. Short appressed vestiture with scattered longer brown hairs on edges.

Tergites all black with pronounced posterolateral projections on 5 to 7. Pygidium projects beyond the elytra in the female.

Ventral segments: All black, except small reddish, lateral, rudimentary (?) luminous organs on segment 8 in the male. These organs are smaller in the female and mostly hidden under the 7th





FIGURES 4-5.—Aedeagus: 4, *Pyractonema depressicornis*; 5, *Pyractonema haemorrhoea*. (a, lateral view; b, dorsal view; and c, ventral view.)

segment. In the male, segment 8 is narrow except for the lobes carrying the luminous tissue and bulbous over the aedeagus. In the female, 8 is small and raised medially over the ovidepositor. Male 7th is deeply emarginate, sometimes with a small median point.

Legs black, compressed, shorter in female. Tibial spurs very short, pattern apparently 0-1-1. Claws without basal spurs.

Aedeagus as in figure 4.

This is an easily recognizable species, of which 37 specimens were received, only two being females. Many of them were longer than the 14.3 mm. maximum given by Solier, and one was as small as 11 mm.

*Pyractonema haemorrhoea* (Fairmaire and Germain)

## FIGURE 5

*Lucidota haemorrhoea* Fairmaire and Germain, Coleop. Chilensia, vol. 2, p. 2, 1862.

Material: About 180 specimens of the typical variety, including 19 females. One pair in copulation. None of these specimens was as small as 10 mm. long, as given in the original description, and the majority were 13 or more mm. long. Also, 20 shorter and more oval specimens, including 6 females, which are described separately below. 108 specimens in the collection of the California Academy of Sciences, including intermediate forms.

General: A medium to large size nonluminous lampyrid, with the apical ventral abdominal segment red, rarely yellow or white.

TYPICAL FORM: Dimensions: Males 13.8 to 18.9 mm. long by 4.1 to 6.1 mm. broad; average 16.65 by 5.25 mm. Females 12.0 to 18.5 mm. long by 4.6 to 6.85 mm. broad; average 16.8 by 6.05 mm.

Pronotum black with two longitudinal subrectangular red areas usually with yellow lateral borders, occupying about 0.3 or more of the total surface, sometimes less in the females. Reflexed laterally and slightly so apically. About 0.7 to 0.75 as long as wide, proportionately slightly wider in the females. Approximately semicircular in outline, slightly prominent apically.

Scutellum and mesonotal plates black.

Elytra black, usually tricostate. Explanate margins narrow. About 0.75 to 0.8 of total length. In the male, the elytra are at least as long as the abdomen. In the female, segment 8 and sometimes 7 are exposed.

Head black, not markedly bulbous between the antennal sockets. Clypeus short, black, semicircular.

Antennae black, compressed. Articles 4, 5, and 6 may be widest, but usually 4 to 10 subequal. About 0.5 to 0.6 of body length in males, 0.4 to 0.5 in females.

Tergites all black, except that the red last ventral segment shows through the pygidium; the latter medially emarginate, longer, and nearly as wide as segment 7 in male, triangular in female.

Ventral segments 2 to 7 black, 8 almost entirely red, rarely yellow or white, but may have a black apical margin or lateral angles. Medially emarginate in male. A prominent "pore" on each rudimentary luminous organ. In female, segment 8 triangular, apically V-notched.

Legs black, compressed. Tibial spurs very inconspicuous. Claws not spurred, but may have a short "thumb" at base.

Aedeagus as in figure 5.

**ATYPICAL FORM:** The 20 shorter specimens differ mainly in dimensions from the typical form, and naming them even as a variety does not seem justified.

**General:** Resembling the typical form, but shorter and proportionately broader, outline elliptical, with relatively wide explanate elytral margins.

**Dimensions:** Males 10.0 to 12.9 mm. long by 4.1 to 4.6 mm. broad; average 11.6 by 4.4 mm. Females 12.0 to 14.8 mm. long by 3.0 to 5.9 mm. broad; average 13.5 mm. by 5.3 mm.

**Pronotum** as in the typical form. Average length 0.67 of width in male, 0.69 in female.

**Elytra** 0.7 of body length in males, 0.77 in females.

**Antennae** tend to be relatively shorter than in the typical form, about 0.44 of body length.

Two of the males had no black on the pronotum, and another had only a brown spot in the apical fourth and a streak along the basal margin. One had a very narrow black border and an incomplete median vitta. In one specimen, the scutellum and mesonotal plates were pinkish brown. In all specimens, the latter were unusually wide. Two females had incomplete median vittae, and in one of these the black borders were also incomplete, and were very narrow in two specimens. In one male, the pygidium was largely black instead of the usual pink with black lateral and apical borders.

**Elytral explanate margins** conspicuously wider than in the typical form, usually widest at basal fourth.

The shorter body and elliptical outline suggest that this variant may have been the basis for the original description of the species.

*P. haemorrhoea* is apparently a clearly distinct species, and it is odd that Solier failed to mention the characteristic red terminal abdominal segments in any of his descriptions. About 180 specimens were among the material received from Peña, all of which were longer than Fairmaire's length of 10 mm., and 20 of which were of a smaller and proportionately broader form. The collection of the California Academy of Sciences contained specimens intermediate between these two forms.

#### *Pyractonema latior*, new species

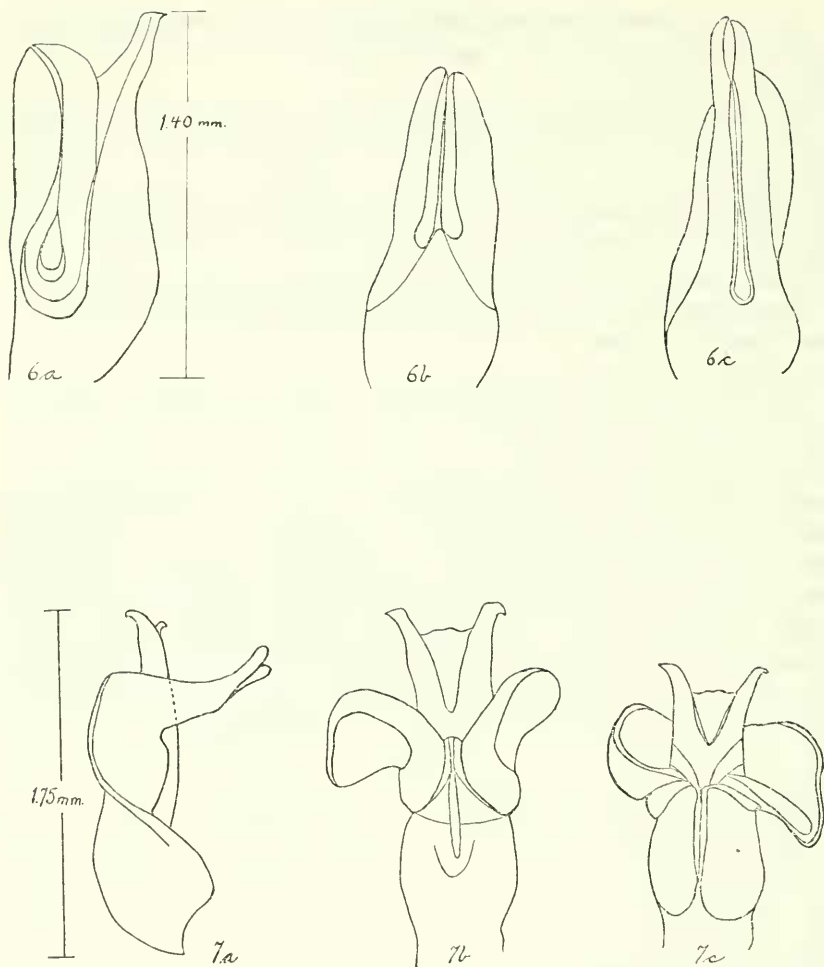
#### FIGURE 6

**Material:** 29 males and 11 females, including two pairs in copulation.

**Type locality:** Widely distributed, but Estero de Leiva, Parral, Chile, may be given.

**Holotype** and 4 paratypes, USNM 62821.

**General:** A small, rather broad, nonluminous lampyrid with a pink pronotal disc, usually partially divided by a narrow infusate longi-



FIGURES 6-7.—Aedeagus: 6, *Pyractonema latior*; 7, *Pyractonema nigripennis*. (a, lateral view; b, dorsal view; and c, ventral view.)

tudinal vitta, and a narrow brown to black pronotal border, usually incomplete anterolaterally. Distinguishable from *P. angustata* by its broader, more elliptical outline and pronotal infuscation.

Dimensions: Males 7.4 to 12.3 mm. long by 2.55 to 4.3 mm. broad; average 9.45 by 3.33 mm. Females 7.1 to 10.0 mm. long by 2.55 to 4.05 mm. broad; average 8.45 by 3.1 mm.

Pronotum disc with subrectangular, transverse, red to pink area occupying half or more of the total surface of the pronotum. This area is usually at least partly divided by a narrow triangular brown to black vitta, the point basad. Narrow brown to black basal and lateral borders, the latter usually evanescent at apical two-thirds,



but occasionally completing a narrow border around the apex. This border and/or the median vitta may be absent, but in these cases there is an indistinct triangular infuscation in the apical half. Remainder of pronotum transparent or at least translucent colorless to yellowish. Lateral edges reflexed, apically little if at all so.

Scutellum and mesonotal plates black to dark brown.

Elytra subparallel, giving a narrowly elliptical outline. Black. Explanate margins narrow, about one-sixth of elytral width.

Frons black. Not markedly bulbous between the antennae.

Antennae about half of body length in both sexes. Narrower than in the *P. nigripennis* group and appear only slightly serrate.

Tergites all dark brown to black. Pygidium in male may be truncate, bidentate, or tridentate, or sinuate: in female, tapering to a broadly rounded apex. Posterolateral pointed lobes on 5, 6, and 7 less developed in the female.

Ventral segments all dark brown to black. Sometimes with narrow black apical borders. Rudimentary luminous organs usually absent, sometimes represented by pale spots.

Legs black. Tibial spurs very small, pattern apparently 0-1-1. Claws simple.

Aedeagus as in figure 6.

#### *Pyractonema minor*, new species

Material: 6 males and 5 females, 3 pairs in copulation, and portions of about a dozen other specimens. Holotype, allotype and 5 paratypes in the Peña collection.

Type locality: Quillota, Las Palmas, Valparaiso Province, Chile.

Dimensions: Males 3.5 to 5.1 mm. long by 1.0 to 1.65 mm. broad. Females 4.25 to 5.5 mm. long by 1.15 to 1.65 mm. broad.

Pronotum: Conspicuously nearly as long as broad, widest at apical third, narrowing slightly to base; angles obtuse. Apical and lateral borders black, with submarginal punctures. Basal two-thirds orange-red (yellow in one specimen). Apical third transparent back of black border. Disc flat and smooth. No median vitta.

Scutellum and mesonotal plates black.

Elytra black, parallel, rugose. Very narrow explanate margins which may appear paler than the disc. About 0.8 of total length in males, shorter in females, in which 1 to 3 abdominal segments may be exposed.

Body completely black. Thin and flat in horizontal plane. No indication of luminous organs. Pygidium trilobed.

Head black. Mouth parts very small and of same character as in other species.

Antennae black, compressed, scarcely serrate. Article 3 widest, 4

to 11 narrowing slightly progressively. In males about 0.55 of body length, in females about 0.45.

Legs black, compressed. Claws simple.

There are two specimens of this species, labeled "Chile" and "E. C. Reed" in the collection of the U.S. National Museum.

*Pyraetionema nigripennis* group  
(*nigripennis*, *bifenestrata*, *obscura*)

Of the several hundred specimens received from Peña, a series of 340 males selected without reference to the collecting station were mounted and measured. They furnished a complete series at 0.25 mm. intervals from 5 to 19 mm. long. Two more were 19.5 mm. In 147 females, a nearly complete series from 6 to 22 mm. long was obtained, two more being 24 mm. long. Plotting the number of male specimens falling in each 0.25 mm. group showed principal maxima at 9.5, 12.5, and 17 mm. lengths, and secondary maxima at 7 and 14 mm. The females distributed somewhat similarly, but less definitely. There were several pairs in copulation, and in each case the components were of approximately the same size.

On the basis of total length, it is possible to consider those from 15 to 19.5 mm. long (to 24 mm. in females,) as *nigripennis*; those 11 to 15 mm. long as *bifenestrata*; and those less than 11 mm. long as *obscura*. This designation is arbitrary, of course, and involves some overlapping between the species. Alternatively one must consider that they all represent a single species highly variable in size. Olivier's (1907) illustration of *nigripennis* gives a scale length of 14.75 mm., and it might therefore be either *nigripennis* or *bifenestrata* by the separation on total length proposed above. Collections made at the same station and time frequently contained specimens of several sizes. Study of the aedeagi showed that *nigripennis*, *bifenestrata*, and *obscura* exhibited different patterns.

In the initial separation of the specimens in this group, one series was picked out by their relatively small and narrow pronota. These specimens also proved to be intermediate in total length between the larger specimens here called *P. nigripennis*, and the smaller *P. obscura*, and constitute the majority of the specimens here classed as *P. bifenestrata*.

All of the specimens with short elytra, exposing up to 4 abdominal segments, were females, and it seems probable that *P. brevipennis* is a brachelytral form of the female in this group. The shortest elytra were usually found in the largest specimens, but all gradations from 1 to 4 abdominal segments exposed were noted.

In the original descriptions there is no essential difference other than size between *P. nigripennis*, *P. bifenestrata*, *P. binotata*, *P.*

*lugubris*, and *P. obscura*. *P. bardelli* and *P. bioculata* are described as brown, not black, and *P. brevipennis* differs only in the short elytra. In *nigripennis* the thoracic coloration is described as yellow, but Olivier's (1907) illustration shows it as red. One specimen in Peña's collection had yellow instead of red, as did some of those in the California collection, while one specimen of *P. vicina*, as noted, had red instead of yellow. Apparently yellow and red colorations are alternative in this genus. *P. fissicollis* may be dismissed as an abnormality, as noted by Olivier (1899). There were several hundred specimens representing this group in the material sent to me by Peña, the specimens ranging from 5 to 19.5 mm. long in the males and up to 24 mm. in the females. What bearing this situation has on taxonomy is discussed under the species descriptions.

In view of the great superficial similarity of the specimens (or species) in this group in characters other than size, a general description is given below that will apply to all; under the three species are given the dimensions of the admittedly arbitrary divisions for each. The smaller specimens appeared to be somewhat broader proportionately than the larger ones, a difference confirmed by the final measurements.

Pronotum with wide lateral and apical, narrow basal borders, and wide median longitudinal vitta black. Portions of apical edge in front of eyes may be brown. Disc with two subrectangular or reniform red areas (rarely yellow), the color not being particularly brilliant. The median vitta is broader in the females than in males and in *P. nigripennis* usually has an urn-shaped outline. The red area comprises 0.3 to 0.5 of the total surface. Basal edge usually sinuate, angles various. Lateral edges deeply and apical margin usually slightly reflexed. A depression just forward of each red spot. Shallow sulcus, frequently wide, in basal half or third.

Scutellum black. Mesonotal plates black to very dark brown.

Elytra black, tricostate in larger specimens, the costae becoming less pronounced in the smaller specimens. Explanate margins very narrow, about one-seventh or less of the elytral width. In males longer than the abdomen or ending with it; in females usually exposing 1 to 4 abdominal segments. Elliptical outline.

Head with frons black, usually projecting more or less bulbously between the antennal sockets. Eyes relatively small, the distance across them being about 0.55 to 0.6 of the pronotal width. Clypeus short, black, hairy, semicircular, or medially emarginate.

Antennae black, compressed. Articles 3 to 10 subrectangular, base about 0.6 of apical width. Base of 4 to 11 attached near to the outer apical corner of the preceding article in the males, the point of attachment being more nearly median in the females. Vestiture

short, black or dark brown, especially noticeable on the edges. Articles 5 to 8 generally the widest, 9 and 10 narrower, and 11 elliptical. Article 3 shorter than succeeding articles. Length usually 0.5 to 0.6 of the total length in males, about 0.4 in females.

Tergites all black to dark brown, except pygidium, which in males may be partly translucent, apically truncate, sinuate, emarginate, or distinctly tridentate, projecting widely laterally and apically over ventral segment 8. Pygidium triangular in female. 5 to 7 have posterolateral pointed lobes.

Ventral segments all black or dark brown, except for yellowish or pinkish rudimentary luminous organs on 8. These organs are occasionally not observable in the larger specimens and are usually absent in the smaller ones and females. In males, segment 8 is somewhat emarginate with a short median point. In the females, this segment is triangular with a deep apical V-shaped notch.

Legs all black or brown, somewhat compressed. Tibial spurs very small and short, pattern 0-1-1. Claws simple, but may have a basal enlargement.

There seems to be an error in Solier's measurement of the width of *P. binotata* (= *P. obscura*). The size is given as 3 to 3½ lines (6.35 to 7.4 mm.) long by 3¼ lines (6.88 mm.) broad, a measurement which hardly seems possible. Even 2¼ lines (4.77 mm.) would be too broad for any specimens I have seen which could be referred to this species. It seems probable that *P. binotata* was erected on the basis of an unusually broad specimen of *P. obscura*.

Of the remaining species previously described and now listed under *P. obscura*, *P. bardelli* and *P. bioculata* were probably pale or immature specimens of *P. obscura*. E. Olivier's grouping of them and *P. lugubris* as synonyms of *P. obscura* seems justified.

#### *Pyractonema nigripennis* Solier

##### FIGURE 7

*Pyractonema nigripennis* Solier, in Gay, Hist. Fis. Pol. Chile, vol. 4, Zool., p. 448, 1849.

*Pyractonema brevipennis* Solier, in Gay, Hist. Fis. Pol. Chile, vol. 4, Zool., p. 451, 1849.

Material: 100 males and 30 females.

Dimensions: Males 14.75 to 19.5 mm. long by 4.0 to 7.0 mm. broad; average 17.0 mm. by 5.7 mm. Females 14.5 to 24.0 mm. long by 4.0 to 7.0 mm. broad; average 18.1 by 5.3 mm.

Pronotum essentially semicircular, a little prolonged apically. Length about 0.67 of width. Median vitta with urn-shaped outline. Elytra in males about 0.86 of total length. In females about 0.8.

Aedeagus as in figure 7.



*P. nigripennis* is described as having a maximum length of  $17\frac{1}{2}$  lines (37.1 mm.). This measurement should probably read  $7\frac{1}{2}$  lines (15.9 mm.), although it is less than many of the specimens seen.

There seem to be several misprints of dimensions in Solier's descriptions. *P. brevipennis* is described as  $5\frac{1}{4}$  lines (12 mm.) long by  $4\frac{1}{4}$  lines (9.0 mm.) broad. The latter figure is probably an error for  $1\frac{1}{4}$  or  $2\frac{1}{4}$  lines (3.53 or 5.65 mm.).

***Pyractonema bifenestrata* (Fairmaire and Germain)**

FIGURE 3

*Lucidota bifenestrata* Fairmaire and Germain, Coleop. Chilensia, vol. 2, p. 2, 1862.

Material: 125 males and 38 females.

Dimensions: Males 9.6 to 15.0 mm. long by 3.0 to 5.0 mm. broad; average 12.3 by 4.1 mm. Females 10.5 to 14.0 mm. long by 3.5 to 5.5 mm. broad; average 12.7 by 4.3 mm.

Pronotum smaller and narrower than in *P. nigripennis*. About 0.8 as long as broad in males, 0.75 in females.

Elytra about 0.85 of total length in males, 0.7 in females.

Aedeagus as in figure 3.

It is noted that there is no reference in the descriptions or key to the "two windows" which should apparently be present on the pronotum of *P. bifenestrata*. Two translucent areas in the apical portion of the pronotum were observed in several specimens of different species, and it seems probable that these areas are a modification of the pronotal pigmentation which may occur generally in this genus.

***Pyractonema obscura* (Olivier)**

FIGURE 8

*Lampyris obscura* G. A. Olivier, Ent. Coleop. vol. 2 (28), p. 18, 1790.

*Lampyris bardelli* le Guillou, Rev. Zool. vol. 7, p. 222, 1844.

*Pyractonema lugubris* Solier, in Gay, Hist. Fis. Pol. Chile, vol. 4, Zool., p. 449, 1849.

*Pyractonema binotata* Solier, in Gay, Hist. Fis. Pol. Chile, vol. 4, Zool., p. 449, 1849.

*Chauliognathus bioculata* Blanchard, in Dumont D'Urville, Voy. Pol Sud, vol. 4, p. 70, pl. 5, fig. 7, 1853.

*Pyractonema fissicollis* Solier, in Gay, Hist. Fis. Pol. Chile, vol. 4, Zool., p. 449, 1849.

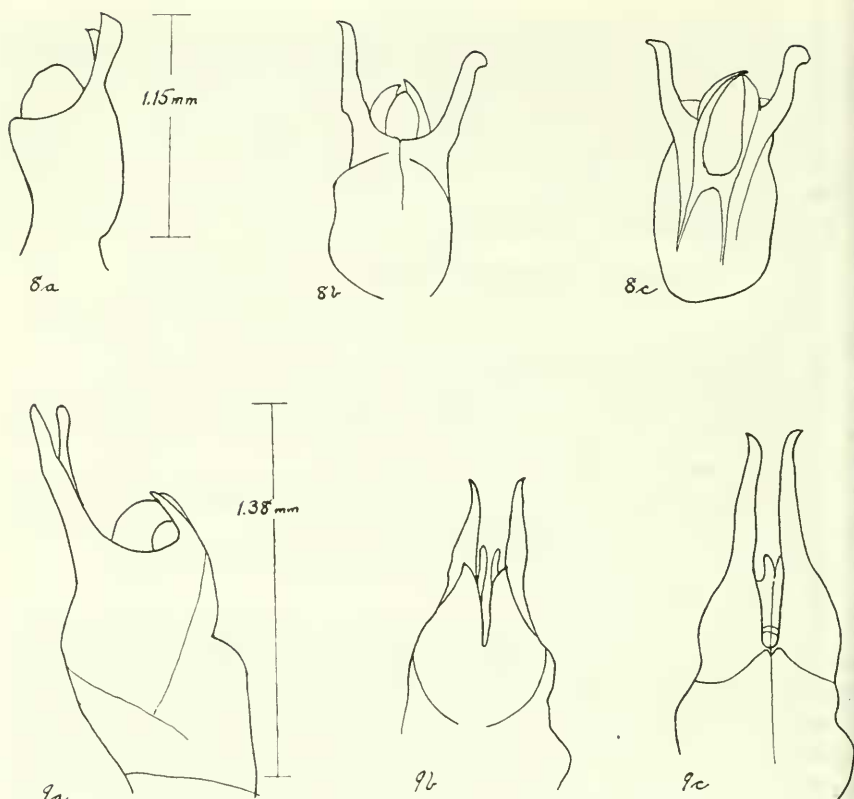
Material: 115 males and 79 females.

Dimensions: Males 5.0 to 11.0 mm. long by 2.0 to 4.6 mm. broad; average 9.5 by 3.25 mm. Females 6.0 to 14.0 mm. long by 2.2 to 3.45 mm. broad; average 10.2 by 3.1 mm.

Pronotum about as wide as in *P. bifenestrata* but proportionately shorter. Length about 0.63 of width.

Elytra about 0.8 of length in males. 0.7 of length in females with a slightly elliptical outline.

Aedeagus as in figure 8.



FIGURES 8-9.—Aedeagus: 8, *Pyractonema obscura*; 9, *Pyractonema rhododera*. (a, lateral view; b, dorsal view; and c, ventral view.)

***Pyractonema rhododera* Solier**

FIGURE 9

*Pyractonema rhododera* Solier, in Gay, Hist. Fis. Pol. Chile, vol. 4, Zool., p. 449, 1849.

Material: 14 males and 1 female.

General: A small, narrow, nonluminous lampyrid with a relatively small coral-red pronotum.

Dimensions: Males 7.3 to 11.9 mm. long by 2.0 to 3.5 mm. broad; average 9.26 by 2.8 mm. Female 6.8 mm. long by 2.6 mm. broad.

Pronotum small, 0.8 as long as broad. Occasionally widest at basal third or half. Posterolateral angles variable in acuteness and position relative to the lateral margins. Laterally somewhat reflexed. Disc opaque coral-red, with no median vitta, but usually a sulcus in basal half. A narrow black border around the red area, sometimes brownish just forward of eyes.

Scutellum and mesonotal plates black, the latter dull.

Elytra in males about 0.85 of total length. In females about 0.8 of total length. Parallel, uniformly black. Very narrow explanate margins. No pale borders or other ornamentation.

Head presents no specific features and is very similar to that of the *nigripennis* group.

Antennae black, hairy, compressed, generally similar to those in the *nigripennis* group. In occasional specimens articles 3 to 10 were noticeably wider in proportion to length than usual.

Tergites all black. Pygidium truncate, sinuate, or tridentate apically, not greatly widened over last abdominal segments.

Ventral segments usually all black, sometimes medially brown. Little or no evidence of luminous organs.

Legs black. Tibial spurs not discernible. Claws simple.

Aedeagus as in figure 9.

Solier remarks on the wide range of size in this species. It is curious, however, that his description of this species says nothing definite about a "red neck," other than the two red spots on the pronotum, which would not differentiate it from the foregoing group of species. This description leads me to suspect that Solier may have missed the true specimens of *P. rhododera* and written his description from others belonging in the *P. nigripennis* group. The "red necks" here described somewhat resemble *P. albomarginata* but lack the pale elytral borders.

#### *Pyractonema subulipennis* (Fairmaire and Germain)

*Lucidota subulipennis* Fairmaire and Germain, Coleop. Chilensia, vol. 2, p. 3, 1862.

No specimens representing this species, which has a red abdomen, were received.

#### *Pyractonema vicina* Solier

*Pyractonema vicina* Solier, in Gay, Hist. Fis. Pol. Chile, vol. 4, Zool., p. 448, 1849.

Material: One female in the collection of the California Academy of Sciences, and two males in the U.S. National Museum identified by E. Olivier.

General: A small, rather narrow, nonluminous lampyrid usually with a yellow pronotum (sometimes red) bearing black markings.

Dimensions: 9.0 to 12.0 mm. long by 2.8 to 3.0 mm. broad.

Pronotum 0.67 as long as wide, nearly as wide at base as elytra at humeri. Ground color light yellow (red in one ♂). Reflexed lateral margins brown for about one half their width. Brown basal border and truncate longitudinal irregularly triangular area in apical three-fourths.

Scutellum and mesonotal plates brown, the latter ivory in one ♂ specimen.

Elytra 0.8 of total length, subparallel, distinctly bicostate, deflexed over abdominal segments, especially apically. Very narrow explanate margins. Terminal abdominal segments not exposed. Brown.

Head with frons brown, bent sharply backwards and transversely impressed above antennal sockets. Width across eyes 1.15 mm., between eyes 0.65 mm. Eyes rather small. Maxillary palpi dark brown, of the usual conoidal outline. Labial palpi dark brown, securiform. Clypeus brown, short, margin almost straight. Mandibles small, projecting forward.

Antennae nearly black, compressed but not markedly serrate. First article shorter than 3d. 5.1 mm. long.

Prosternum pinkish yellow. Mesosterna and metasterna brown.

Tergites and abdominal segments brown, with no evidence luminous organs.

Legs brown, with tibial spurs not distinguishable.

This species, usually having a yellow pronotum, was not represent in the Peña shipment.

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